CLAIMS

1. A method of forming an optical transmission line by connecting optically a first optical fiber with a second optical fiber, said method comprising the steps of:

selecting at least one of said first optical fiber and said second optical fiber such that said first and second optical fibers to be connected satisfy the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the absolute value of the difference between A1 and A2 is larger than 0.03 dB/km/μm^4:

[Equation 7]

$$X = 1 - 10^{-A1/\lambda^4/10}$$

$$Y = 1 - 10^{-A2/\lambda^4/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber; and

connecting optically said first optical fiber and said second optical fiber satisfying said relationships.

2. A method of forming an optical transmission line by connecting optically a first optical fiber with a second

optical fiber, said method comprising the steps of:

selecting at least one of said first optical fiber and said second optical fiber such that said first and second optical fibers to be connected satisfy the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the value of ratio (B2/B1) is 0.97 or less:

[Equation 8]

$$X = 1 - 10^{-A1/\lambda^4/10}$$
$$Y = 1 - 10^{-A2/\lambda^4/10}$$
$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber; and

connecting optically said first optical fiber and said second optical fiber satisfying said relationships.

3. A method of forming an optical transmission line by connecting optically a first optical fiber with a second optical fiber, said method comprising the steps of:

selecting at least one of said first optical fiber and said second optical fiber such that said first and second optical fibers to be connected satisfy the relationships that, at one

wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less, the absolute value of the difference between A1 and A2 is larger than 0.08 dB/km/ μm^4, and the value of ratio (B2/B1) is 0.97 or less:

[Equation 9]

$$X = 1 - 10^{-A1/\lambda^4/10}$$

$$Y = 1 - 10^{-A2/\lambda^4/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber; and

connecting optically said first optical fiber and said second optical fiber satisfying said relationships.

4. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the absolute value of the difference between A1 and A2 is larger than 0.03 dB/km/ μm^4:

[Equation 10]

$$X = 1 - 10^{-A1/\lambda^4/10}$$
$$Y = 1 - 10^{-A2/\lambda^4/10}$$
$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

5. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the value of ratio (B2/B1) is 0.97 or less:

[Equation 11]

$$X = 1 - 10^{-A1/\lambda^4/10}$$
$$Y = 1 - 10^{-A2/\lambda^4/10}$$
$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering

coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

6. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less, the absolute value of the difference between A1 and A2 is larger than 0.08 dB/km/μm^4, and the value of ratio (B2/B1) is 0.97 or less:

[Equation 12]

$$X = 1 - 10^{-A1/\lambda^4/10}$$

$$Y = 1 - 10^{-A2/\lambda^4/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which A1 shows a Rayleigh scattering coefficient of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, A2 shows a Rayleigh scattering coefficient of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

7. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the

relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the error of the connection loss measurement according to the OTDR test is 0.2 dB or less and that the absolute value of the difference between A1 and A2 is larger than 0.03 dB/km/μm^4,

in which A1 is a Rayleigh scattering coefficient of said first optical fiber, and A2 is a Rayleigh scattering coefficient of said second optical fiber.

8. An optical transmission line having comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the error of the connection loss measurement according to the OTDR test is 0.2 dB or less and that the value of ratio (B2/B1) is 0.97 or less,

in which B1 is a Rayleigh scattering coefficient of said first optical fiber, and B2 is a Rayleigh scattering coefficient of said second optical fiber.

9. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the error of the

connection loss according to the OTDR test is 0.2 dB or less, the absolute value of the difference between A1 and A2 is larger than 0.08 dB/km/μ m^4, and the value of ratio (B2/B1) is 0.97 or less,

in which A1 is a Rayleigh scattering coefficient of said first optical fiber, B1 is a mode field diameter of said first optical fiber, A2 is a Rayleigh scattering coefficient of said second optical fiber, and B2 is a mode field diameter of said second optical fiber.

10. A method of forming an optical transmission line by connecting optically a first optical fiber with a second optical fiber, said method comprising the steps of:

selecting at least one of said first optical fiber and said second optical fiber such that said first and second optical fibers satisfy the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the absolute value of the difference between α 1 and α 2 is larger than 0.03 / λ^4dB/km or more:

[Equation 13]

$$X = 1 - 10^{-(\alpha 1 - 0.02)/10}$$

$$Y = 1 - 10^{-(\alpha 2 - 0.02)/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which α 1 shows a transmission loss of said first

optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber; and

connecting optically said first optical fiber and said second optical fiber satisfying said relationships.

11. A method of forming an optical transmission line by connecting optically a first optical fiber with a second optical fiber, said method comprising the steps of:

selecting at least one of said first optical fiber and said second optical fiber such that said first and second optical fibers satisfy the following relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less, the absolute value of the difference between $\alpha 1$ and $\alpha 2$ is larger than $0.08/\lambda^4$ dB/km or more, and the value of ratio (B2/B1) is 0.97 or less:

[Equation 14]

$$X = 1 - 10^{-(\alpha 1 - 0.02)/10}$$

$$Y = 1 - 10^{-(\alpha 2 - 0.02)/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which $\alpha 1$ shows a transmission loss of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second

optical fiber, and B2 shows a mode field diameter of said second optical fiber; and

connecting optically said first optical fiber and said second optical fiber satisfying said relationships.

12. An optical transmission line comprising a first optical fiber and a second optical fiber connected with each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less and that the absolute value of the difference between $\alpha 1$ and $\alpha 2$ is larger than $0.03 / \lambda^4$dB/km or more:

[Equation 15]

$$X = 1 - 10^{-(\alpha 1 - 0.02)/10}$$

$$Y = 1 - 10^{-(\alpha 2 - 0.02)/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which $\alpha 1$ shows a transmission loss of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

13. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the following relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the value of the parameter K represented by the following equation is 0.2 dB or less, the absolute value of the difference between $\alpha 1$ and $\alpha 2$ is larger than $0.08 / \lambda^4$dB/km or more, and the value of ratio (B2/B1) is 0.97 or less:

[Equation 16]

$$X = 1 - 10^{-(\alpha 1 - 0.02)/10}$$

$$Y = 1 - 10^{-(\alpha 2 - 0.02)/10}$$

$$K = \left| 5\log_{10}\left(\frac{X}{Y}\right) + 10\log_{10}\left(\frac{B2}{B1}\right) \right| ,$$

in which $\alpha 1$ shows a transmission loss of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

14. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the error of the connection loss measurement according to the OTDR test is 0.2 dB or less and that the absolute value of the difference between $\alpha 1$ and $\alpha 2$ is larger than $0.03 / \lambda^4$dB/km or more,

in which $\alpha 1$ shows a transmission loss of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

15. An optical transmission line comprising a first optical fiber and a second optical fiber connected to each other,

said first and second optical fibers satisfying the following relationships that, at one wavelength λ contained in the wavelength range of 1260 nm to 1625 nm, the error of the connection loss measurement according to the OTDR test is 0.2 dB or less, the absolute value of the difference between $\alpha 1$ and $\alpha 2$ is larger than $0.08 / \lambda^4$dB/km or more, and the value of ratio (B2/B1) is 0.97 or less,

in which $\alpha 1$ shows a transmission loss of said first optical fiber, B1 shows a mode field diameter of said first optical fiber, $\alpha 2$ shows a transmission loss of said second optical fiber, and B2 shows a mode field diameter of said second optical fiber.

16. A method of forming an optical transmission line according to claim 1, wherein the Rayleigh scattering coefficient A1 of said first optical fiber is 0.94 dB/km/μm^4 to 1.00 dB/km/μm^4, the Rayleigh scattering coefficient A2 of said second optical fiber is 0.84 dB/km/μm^4 to 0.90 dB/km/μm^4, the mode field diameter B1 of said first optical

fiber at the wavelength of 1310 nm is 9.0 μm to 9.5 μm, and the mode field diameter B2 of said second optical fiber at the wavelength of 1310 nm is 8.3 μm to 9.0 μm.

17. A method of forming an optical transmission line according to claim 4, wherein the Rayleigh scattering coefficient A1 of said first optical fiber is 0.94 dB/km/μm^4 to 1.00 dB/km/μm^4, the Rayleigh scattering coefficient A2 of said second optical fiber is 0.84 dB/km/μm^4 to 0.90 dB/km/μm^4, the mode field diameter B1 of said first optical fiber at the wavelength of 1310 nm is 9.0 μm to 9.5 μm, and the mode field diameter B2 of said second optical fiber at the wavelength of 1310 nm is 8.3 μm to 9.0 μm.

18. An optical fiber mainly comprised of silica glass, comprising a core region extending along a predetermined axis, and a cladding region prepared on an outer periphery of said core region, said fiber having a Rayleigh scattering coefficient of 0.84 dB/km/μm^4 to 0.90 dB/km/μm^4 and a mode field diameter of 8.3 μm to 9.0 μm at the wavelength of 1310 nm.

19. A method of forming an optical transmission line according to claim 10, wherein the transmission loss $\alpha 1$ of said first optical fiber at the wavelength of 1310 nm is 0.32 dB/km to 0.35 dB/km, the transmission loss $\alpha 2$ of said second optical fiber at the wavelength of 1310 nm is 0.28 dB/km to 0.32 dB/km, the mode field diameter B1 of said first optical fiber at the wavelength of 1310 nm is 9.0 μm to

9.5 μm, and the mode field diameter B2 of said second optical fiber at the wavelength of 1310 nm is 8.3 μm to 9.0 μm.

20. An optical transmission line according to claim 12, wherein the transmission loss $\alpha 1$ of said first optical fiber at the wavelength of 1310 nm is 0.32 dB/km to 0.35 dB/km, the transmission loss $\alpha 2$ of said second optical fiber at the wavelength of 1310 nm is 0.28 dB/km to 0.32 dB/km, the mode field diameter B1 of said first optical fiber at the wavelength of 1310 nm is 9.0 μm to 9.5 μm, and the mode field diameter B2 of said second optical fiber at the wavelength of 1310 nm is 8.3 μm to 9.0 μm.

21. An optical fiber mainly comprised of silica glass, comprising a core region extending along a predetermined axis, and a cladding region prepared on an outer periphery of said core region, said fiber having a transmission loss of 0.28 dB/km to 0.32 dB/km at the wavelength of 1310 nm, and a mode field diameter of 8.3 μm to 9.0 μm at the wavelength of 1310 nm.

22. An optical fiber according to claim 21, further having a cable cutoff wavelength of 1260 nm or less and an increase of loss of 0.3 dB/km or less caused by OH-radical at the wavelength of 1380 nm.

23. An optical fiber according to claim 22, wherein the transmission loss at the wavelength of 1310 nm is 0.30 dB/km or less.

24. An optical fiber according to claim 22, wherein a transmission loss at the wavelength of 1380 nm is lower that the transmission loss at the wavelength of 1310 nm.

25. An optical fiber according to claim 22, wherein the value subtracting a transmission loss at the wavelength of 1550 nm from the transmission loss at the wavelength of 1310 nm is 0.13 dB/km or less.

26. An optical fiber according to claim 22, further having a zero dispersion wavelength of 1300 nm or more but 1324 nm or less.

27. An optical fiber according to claim 22, further having a polarization mode dispersion of 0.5 ps/km$^{1/2}$ or less at the wavelength of 1550 nm.

28. An optical fiber according to claim 22, further having a bending loss of 3 dB or less at the bending diameter of 20 mm at the wavelength of 1550 nm.

29. An optical fiber according to claim 22, further having a Petermann-I mode field diameter of 10.0 μm or less at the wavelength of 1550 nm.

30. An optical fiber according to claim 21, further having a cable cutoff wavelength of 1260 nm or less and a dispersion slope of 0.055 ps/nm^2/km or less at the wavelength of 1550 nm.

31. An optical fiber according to claim 30, further having a chromatic dispersion of 16 ps/nm/km or less at the wavelength of 1550 nm.

32. An optical fiber according to claim 31, wherein the chromatic dispersion at the wavelength of 1550 nm is 15 ps/nm/km or less.

33. An optical fiber according to claim 21, further having a dispersion slope of 0.082 ps/nm^2/km or less at the zero dispersion wavelength.

34. An optical fiber according to claim 33, wherein the dispersion slope at said zero dispersion wavelength is 0.080 ps/nm^2/km or less.

35. An optical fiber according to claim 30 or 33, further having a transmission loss of 0.176 dB/km or less at the wavelength of 1550 nm.

36. An optical fiber according to claim 30 or 33, further having a transmission loss of 0.32 dB/km or less and an increase of loss of 0.3 dB/km or less caused by OH-radical at the wavelength of 1380 nm.

37. An optical fiber according to claim 30 or 33, further having a zero dispersion wavelength of 1300 nm or more but 1324 nm or less.

38. An optical fiber according to any one of claims 22, 30 and 33, wherein said cladding region is doped with fluorine.

39. An optical fiber according to claim 38, wherein said core region does not contain GeO_2.

40. An optical fiber according to any one of claims 22, 30 and 33, wherein said core region has an outer diameter of

7.5 μm or more but 8.6 μm or less, and a relative refractive index difference of said core region with respect to said cladding region is 0.36 % or more but 0.42 % or less.